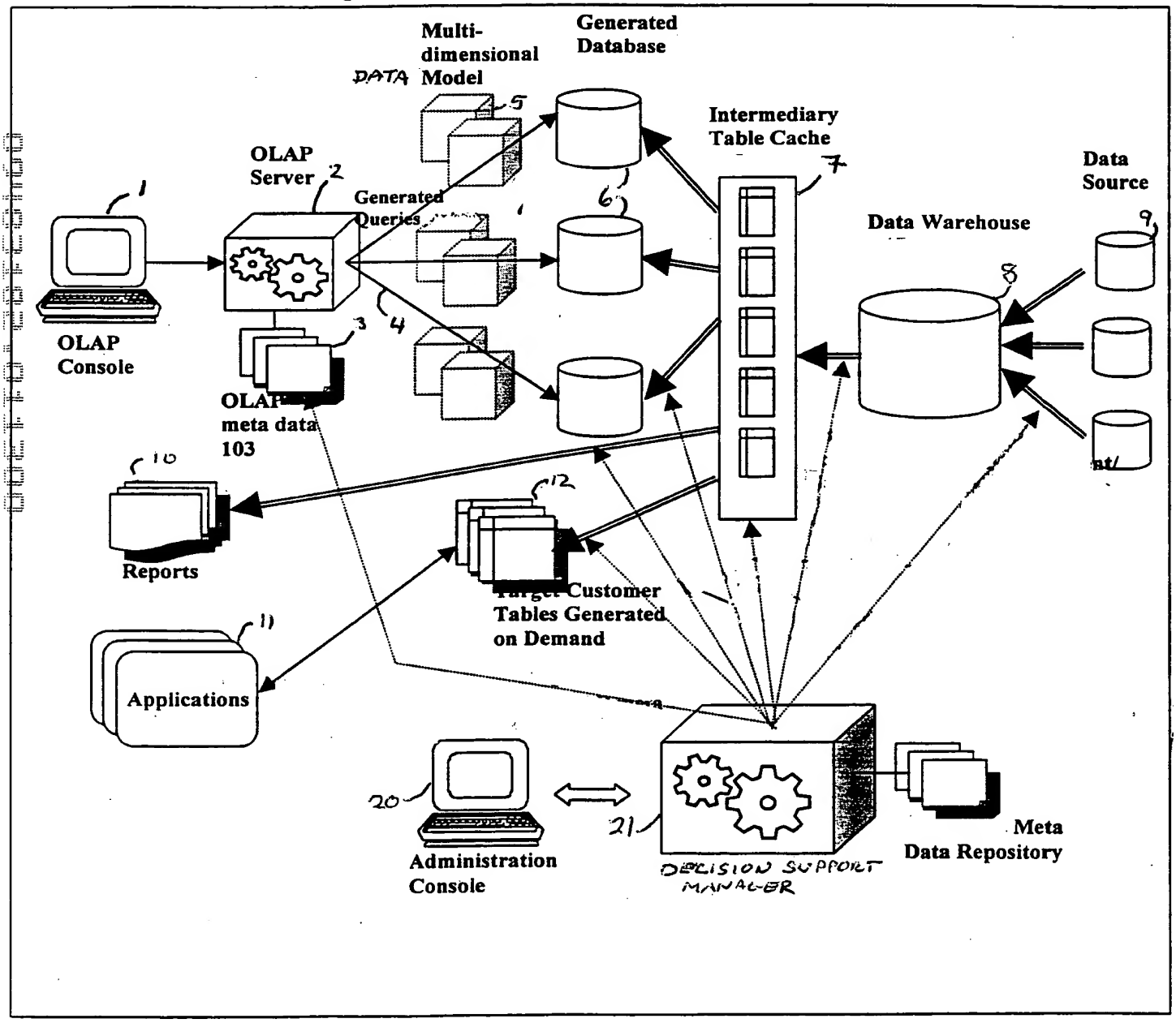

Multi-dimensional Model
Generated Database
DATA
Intermediary Table Cache
OLAP Server
Generated Queries
Data Source
Data Warehouse
OLAP Console
OLAP meta data 103
Reports
Target Customer Tables Generated on Demand
Applications
Administration Console
DECISION SUPPORT MANAGER
Meta Data Repository

Fig. 1A

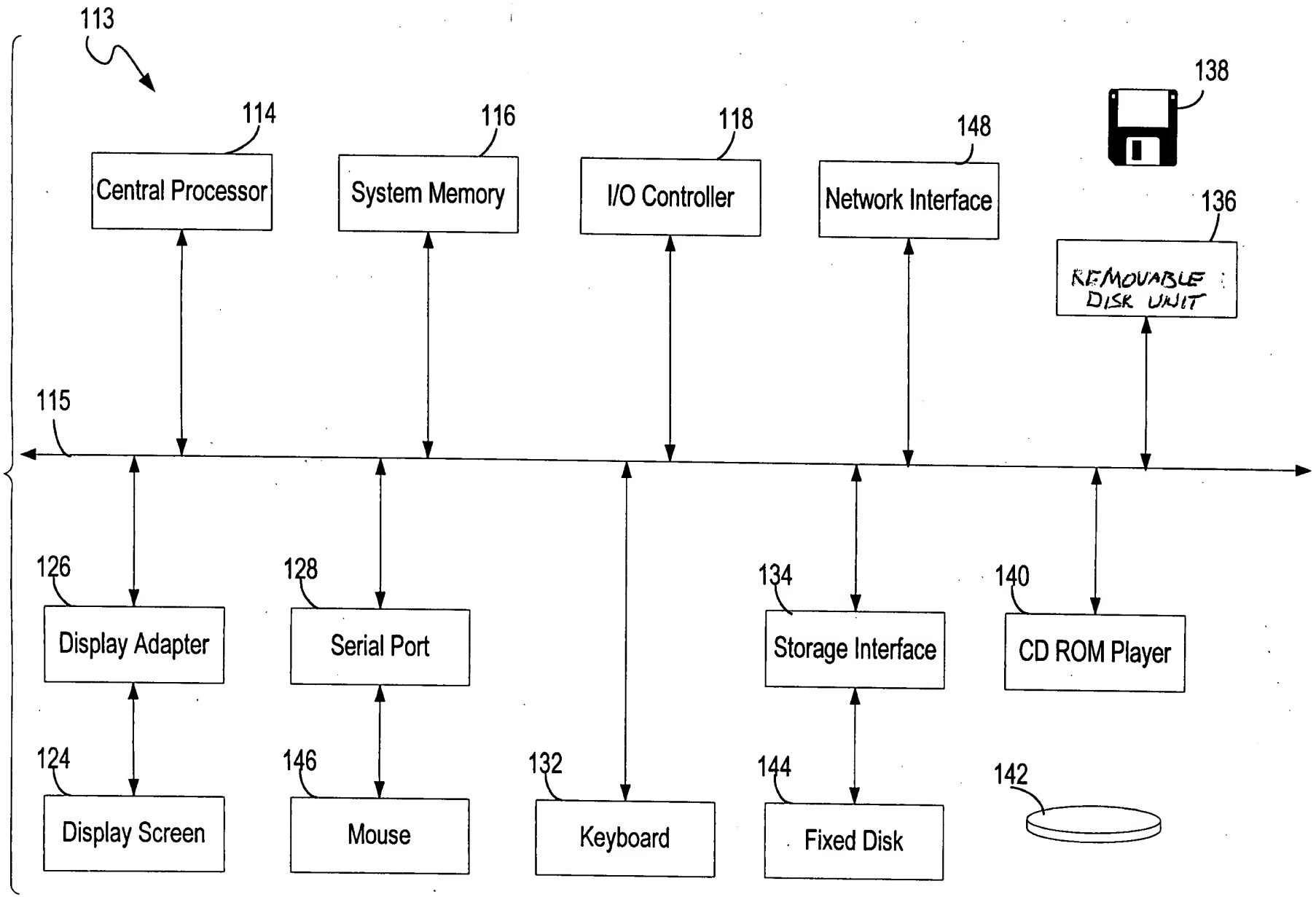


Fig. 1B

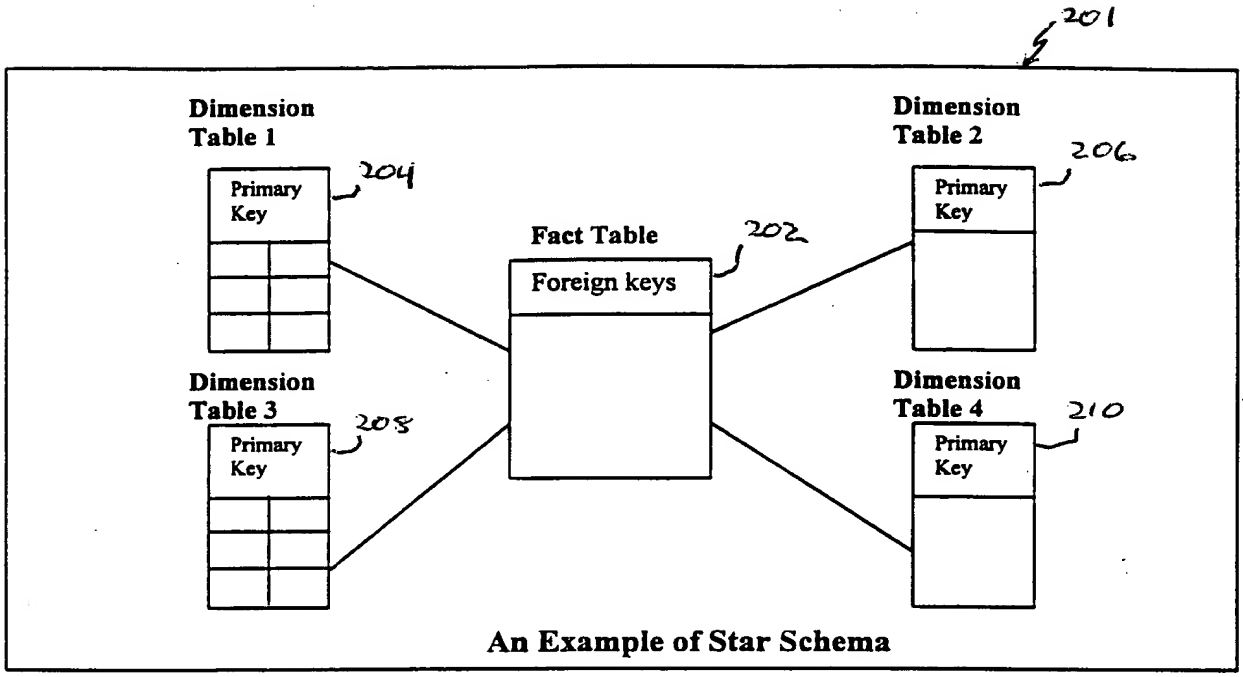

201
Dimension Table 1
Primary Key
204
Fact Table
Foreign keys
202
Dimension Table 2
Primary Key
206
Dimension Table 3
Primary Key
208
Dimension Table 4
Primary Key
210
An Example of Star Schema

Fig. 2A

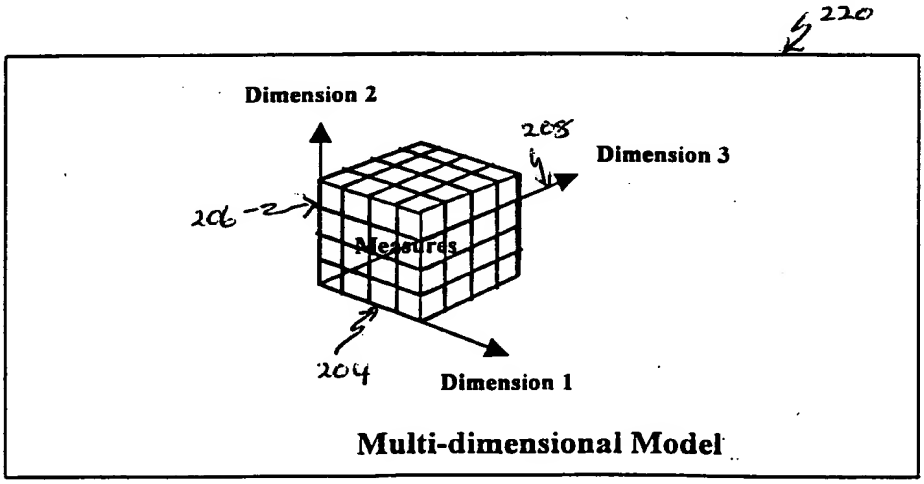

220
Dimension 2
208
Dimension 3
206
Measures
204
Dimension 1
Multi-dimensional Model

Fig. 2B

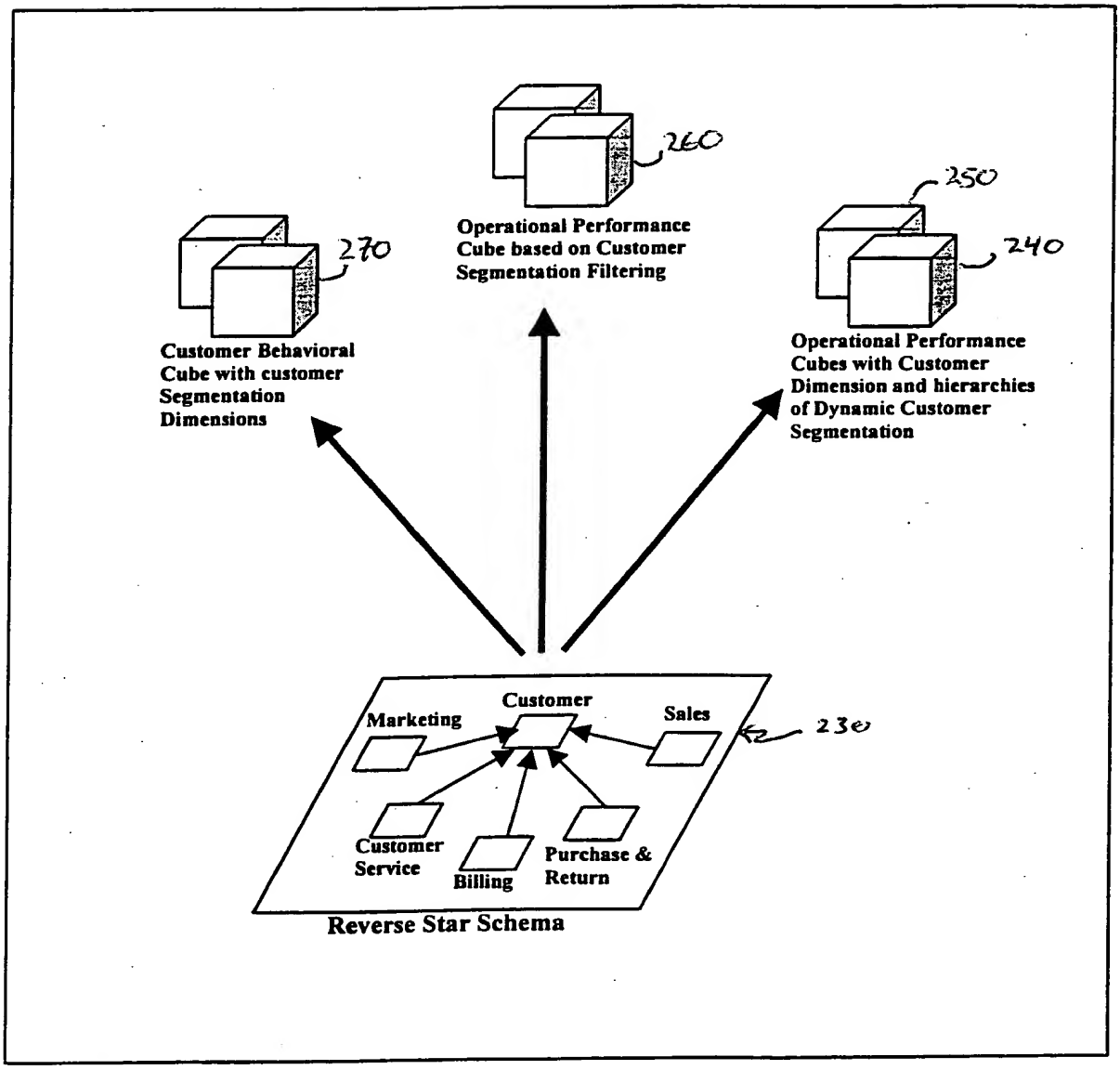

260
250
270
240
Operational Performance Cube based on Customer Segmentation Filtering
Customer Behavioral Cube with customer Segmentation Dimensions
Operational Performance Cubes with Customer Dimension and hierarchies of Dynamic Customer Segmentation
Customer
Marketing
Sales
230
Customer Service
Billing
Purchase & Return
Reverse Star Schema

Fig. 2C

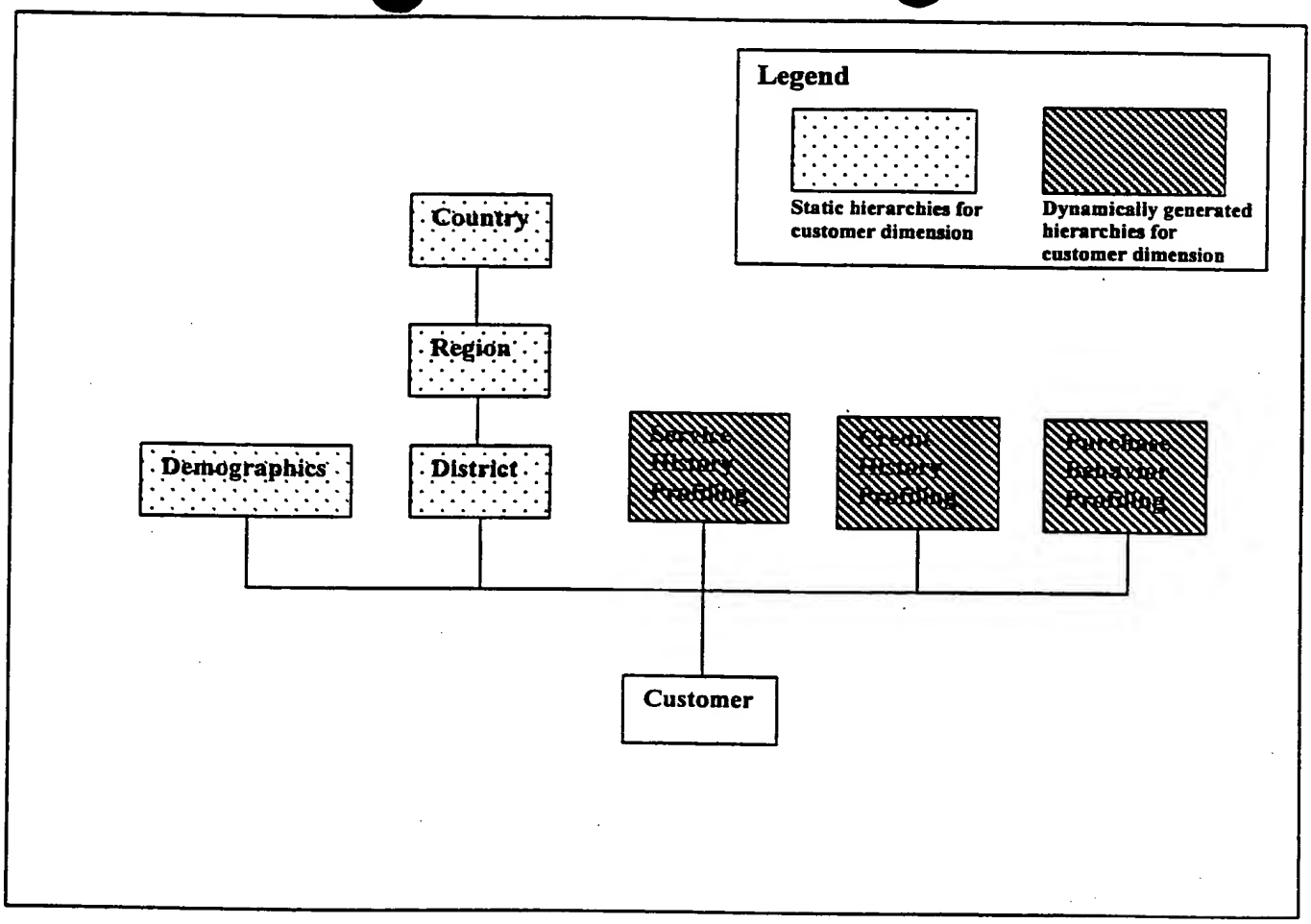

Legend
Static hierarchies for customer dimension
Dynamically generated hierarchies for customer dimension
Country
Region
Demographics
District
Service History Profiling
Credit History Profiling
Purchase Behavior Profiling
Customer

Fig. 2D

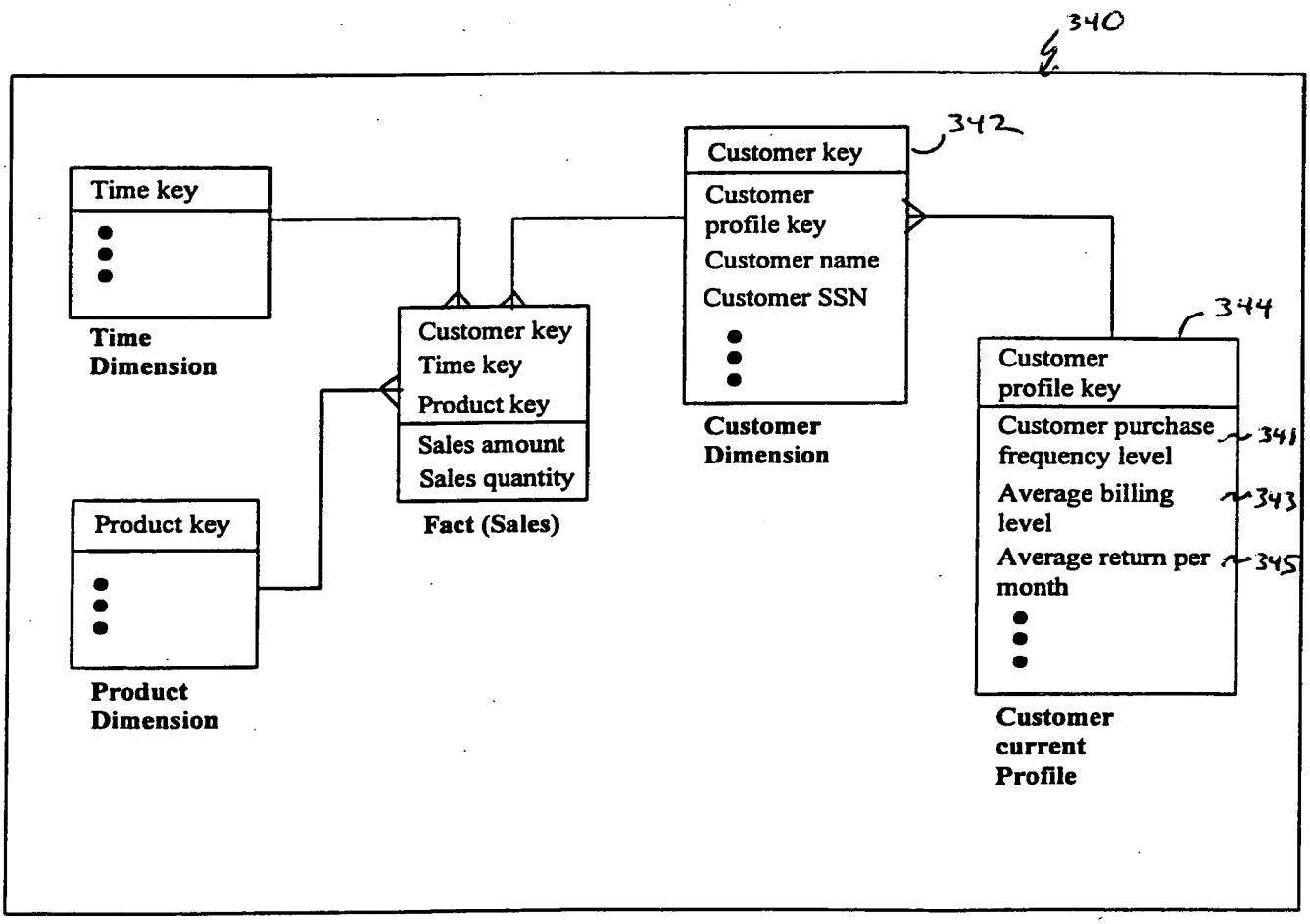

340
342
Customer key
Customer profile key
Customer name
Customer SSN
Customer Dimension
Time key
Time Dimension
Customer key
Time key
Product key
Sales amount
Sales quantity
Fact (Sales)
Product key
Product Dimension
344
Customer profile key
Customer purchase frequency level
341
Average billing level
343
Average return per month
345
Customer current Profile

Fig. 3A

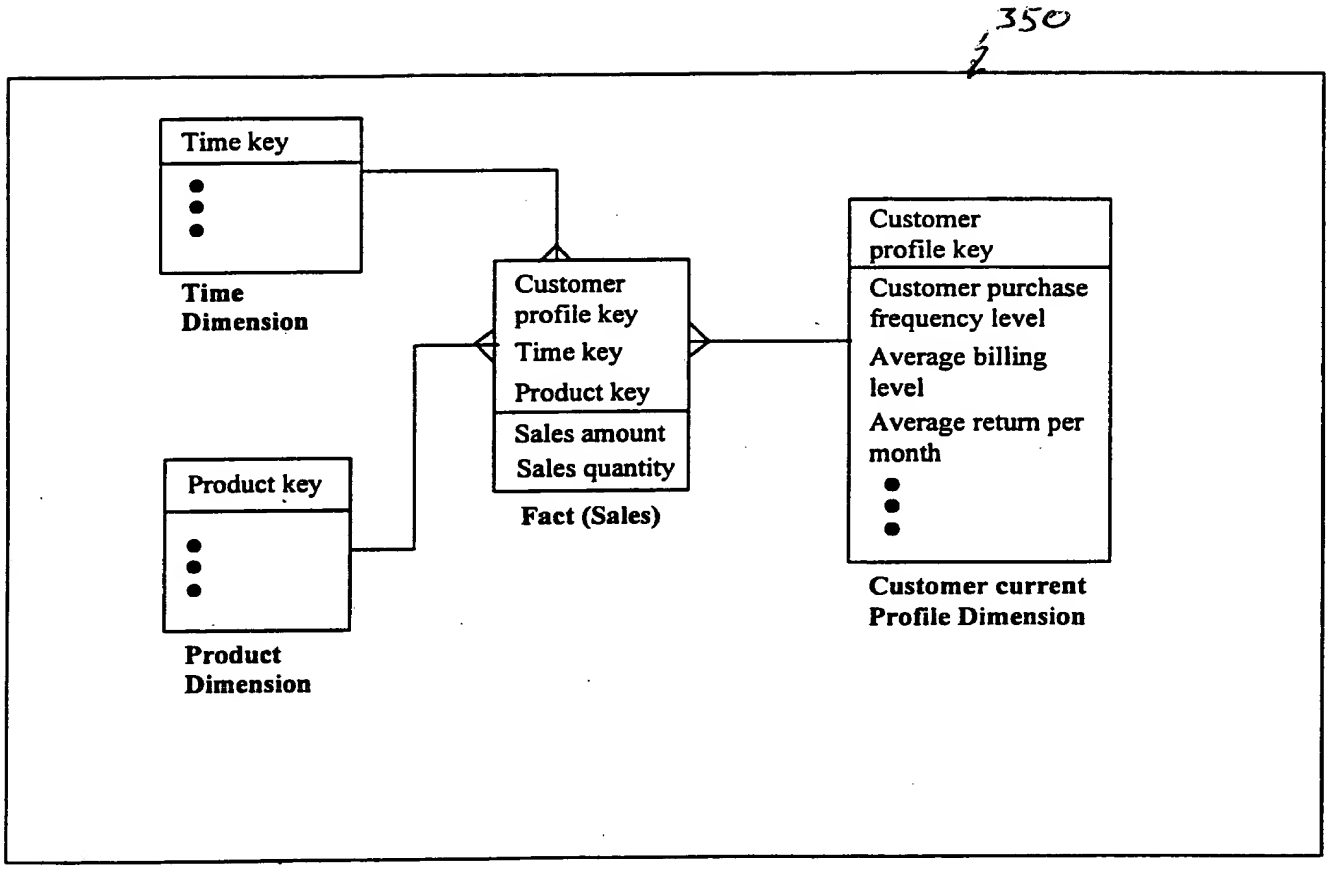

350
Time key
Time Dimension
Customer profile key
Time key
Product key
Sales amount
Sales quantity
Fact (Sales)
Customer profile key
Customer purchase frequency level
Average billing level
Average return per month
Customer current Profile Dimension
Product key
Product Dimension

Fig. 3B

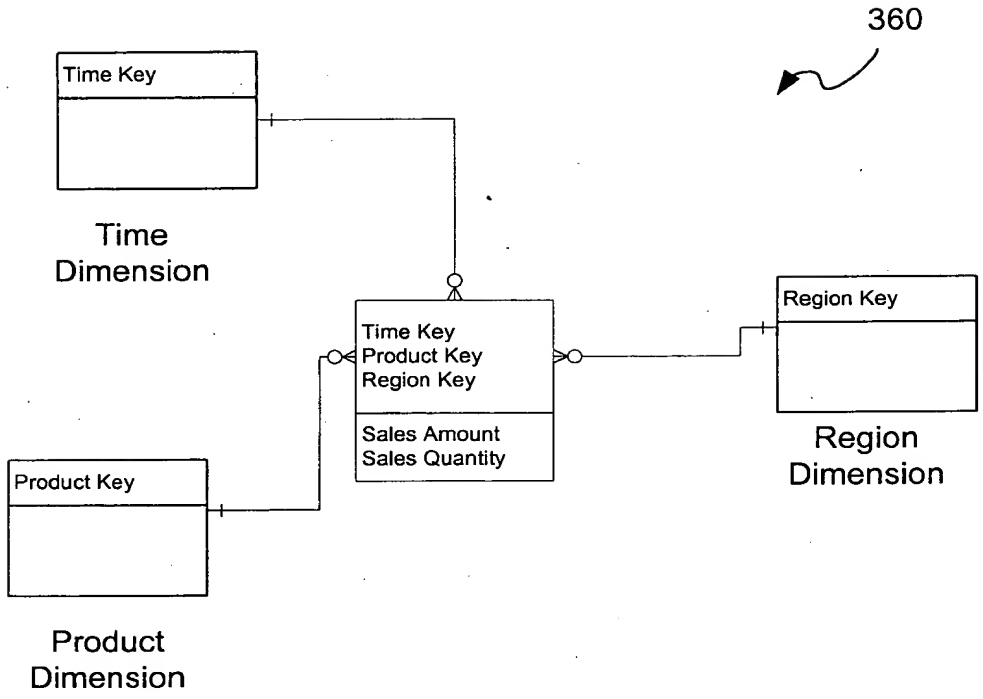

360
Time Key
Time
Dimension
Time Key
Product Key
Region Key
Sales Amount
Sales Quantity
Region Key
Region
Dimension
Product Key
Product
Dimension

Fig. 3C

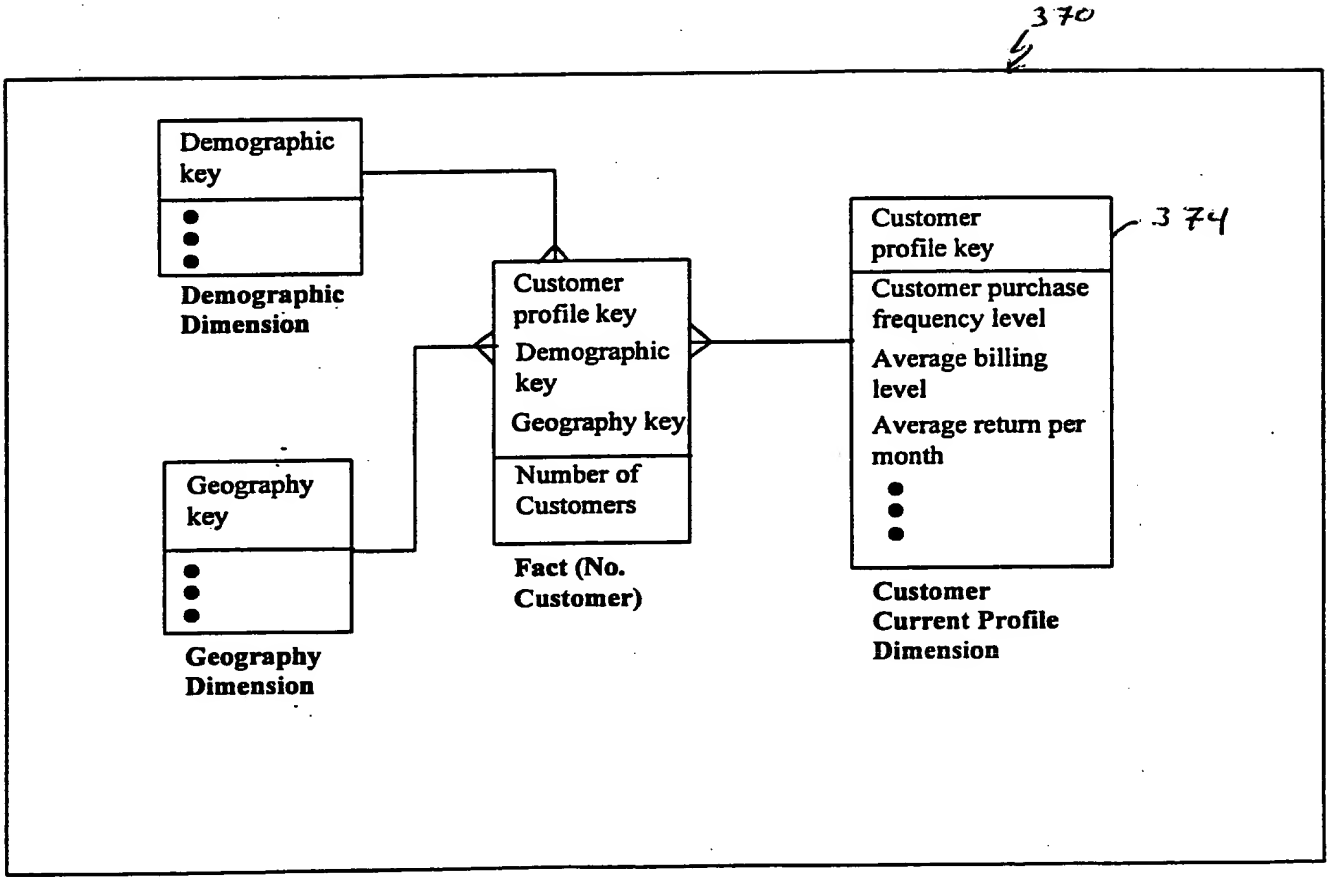

370
Demographic key
Demographic Dimension
Customer profile key
Demographic key
Geography key
Number of Customers
Fact (No. Customer)
Customer profile key
Customer purchase frequency level
Average billing level
Average return per month
374
Customer Current Profile Dimension
Geography key
Geography Dimension

Fig. 3D

CUBE REPORT EXAMPLES

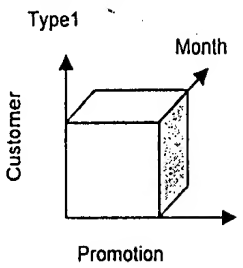
EX1: DESCRIPTION

401

Dimensions:	Elements:
.Customer .Time .Promotion	.Customer Name .Month .Promotion
B-measures:	Formula:
Avg. spend amount	sum(purch_amt) / count(trans)

CUBE TYPE

440



REPORT LAYOUT

405

		Jan-99		
		Avg. Spend Amt.		
Name	ID	Promo 1	Promo 2	Promo 3
Subtotal Top 100				
Subtotal Rest				

More Months

Fig. 4A

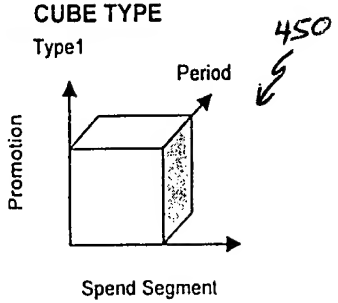
EX2: DESCRIPTION

411

Dimensions:	Elements:
.Customer .Time .Promotion	.Spend Segment .Period .Promotion
B-measures:	Formula:
Avg. spend amount	sum(purch_amt) / count(trans)

CUBE TYPE

450



REPORT LAYOUT

415

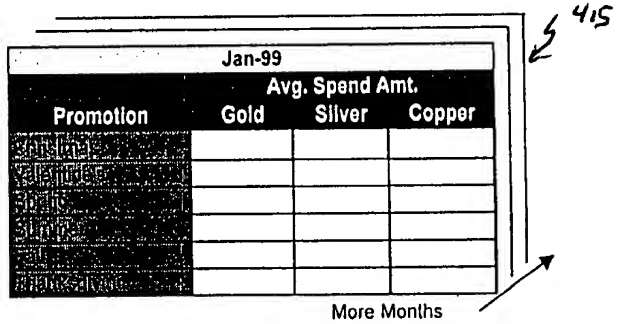


Fig. 4B

EX 3: DESCRIPTION

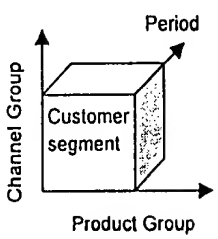
421

Dimensions: .Channel .Product .Time	Elements: .Channel Group .Product Group .Period
B-measures: Sales Contribution	Formula: sum(purch_amt) *filtered* / sum(purch_amt)
Filter Dimension: Customer	Filter Elements: Customer Segment

CUBE TYPE

Type 2

460



REPORT LAYOUT

425

Jan-99			
	Sales Contribution		
Product Group	On-line	Store	Catalog
[illegible]			
[illegible]			
[illegible]			
[illegible]			
[illegible]			
[illegible]			
Data Set: Customer Segment =1			

More Months

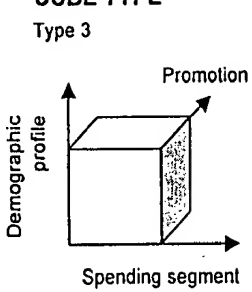
Fig. 4C

EX 4: DESCRIPTION

Dimensions:	Elements:
.Customer	.Spend Segment .Demographic Profile
.Promotion	.Promotion
B-measures:	Formula:
Count of Customer	count(cust_key)

CUBE TYPE

Type 3



REPORT LAYOUT

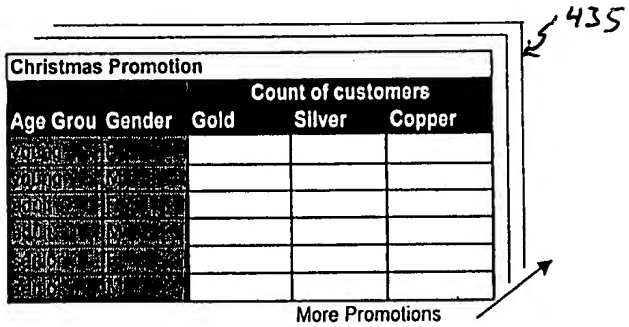


Fig. 4D

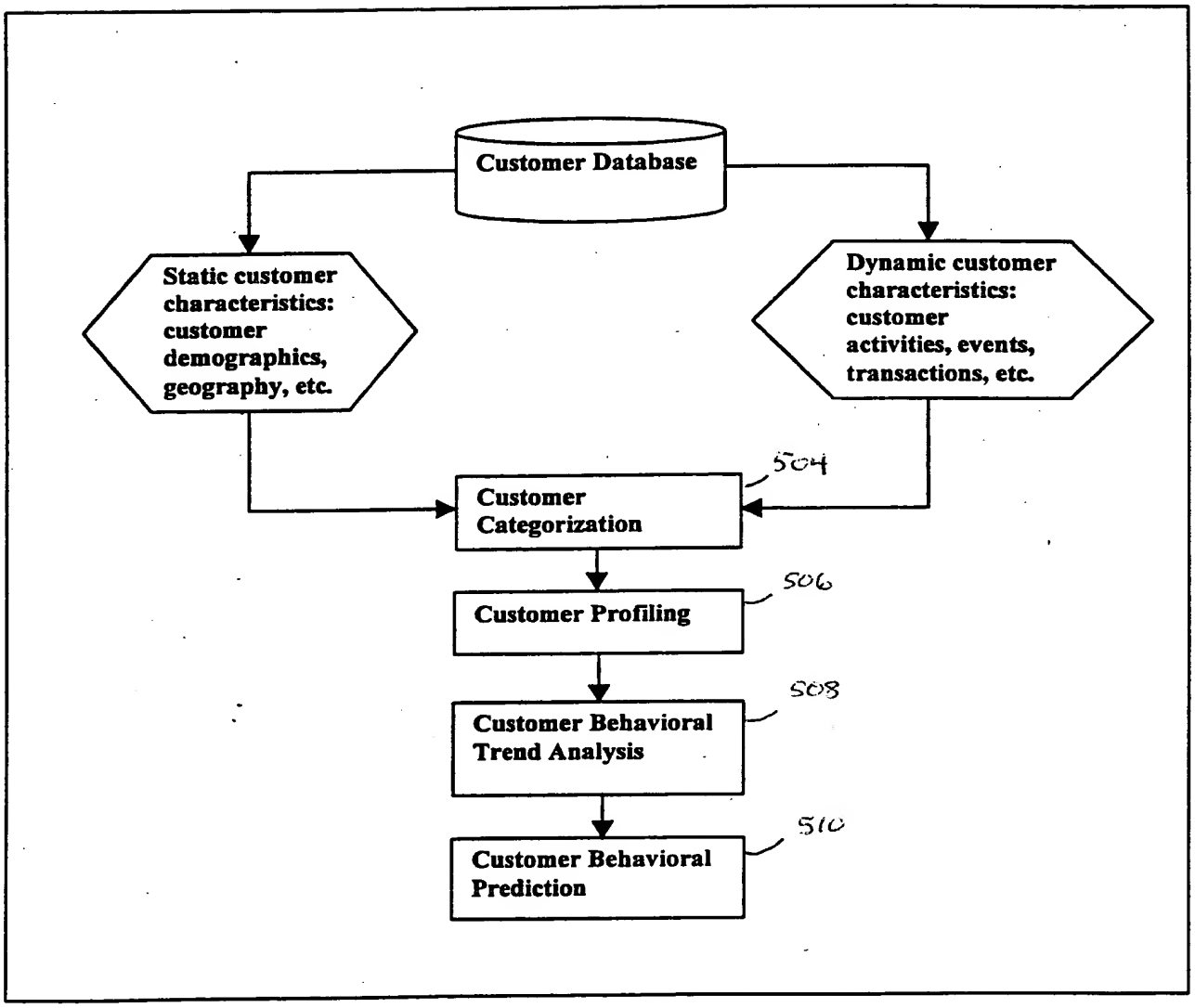

Customer Database
Static customer characteristics: customer demographics, geography, etc.
Dynamic customer characteristics: customer activities, events, transactions, etc.
504
Customer Categorization
506
Customer Profiling
508
Customer Behavioral Trend Analysis
510
Customer Behavioral Prediction

Fig. 5A

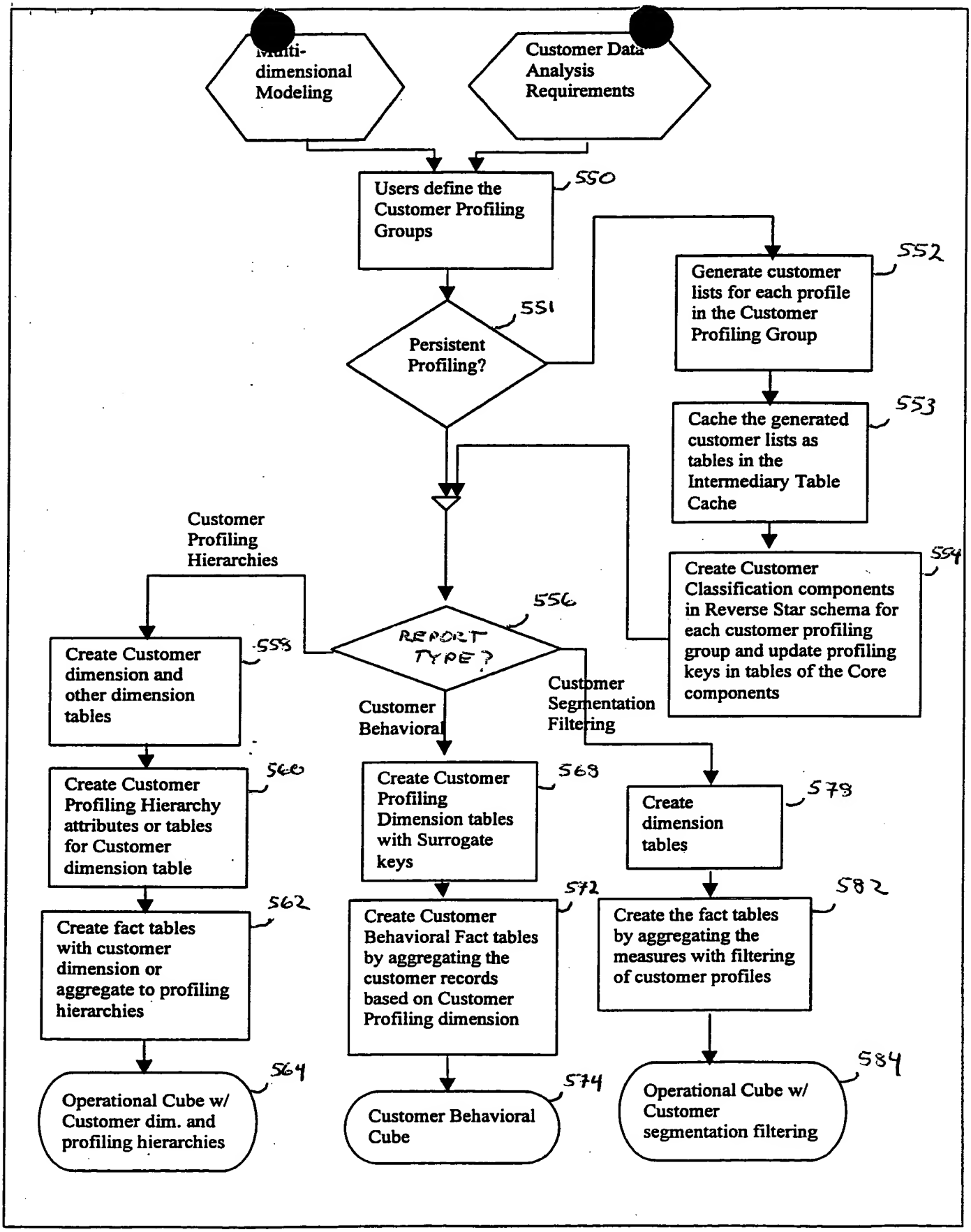

Multi-dimensional Modeling
Customer Data Analysis Requirements
Users define the Customer Profiling Groups
550
Persistent Profiling?
551
Generate customer lists for each profile in the Customer Profiling Group
552
Cache the generated customer lists as tables in the Intermediary Table Cache
553
Create Customer Classification components in Reverse Star schema for each customer profiling group and update profiling keys in tables of the Core components
554
Customer Profiling Hierarchies
REPORT TYPE?
556
Create Customer dimension and other dimension tables
558
Create Customer Profiling Hierarchy attributes or tables for Customer dimension table
560
Create fact tables with customer dimension or aggregate to profiling hierarchies
562
Operational Cube w/ Customer dim. and profiling hierarchies
564
Customer Behavioral
Create Customer Profiling Dimension tables with Surrogate keys
568
Create Customer Behavioral Fact tables by aggregating the customer records based on Customer Profiling dimension
572
Customer Behavioral Cube
574
Customer Segmentation Filtering
Create dimension tables
578
Create the fact tables by aggregating the measures with filtering of customer profiles
582
Operational Cube w/ Customer segmentation filtering
584

Fig. 5B

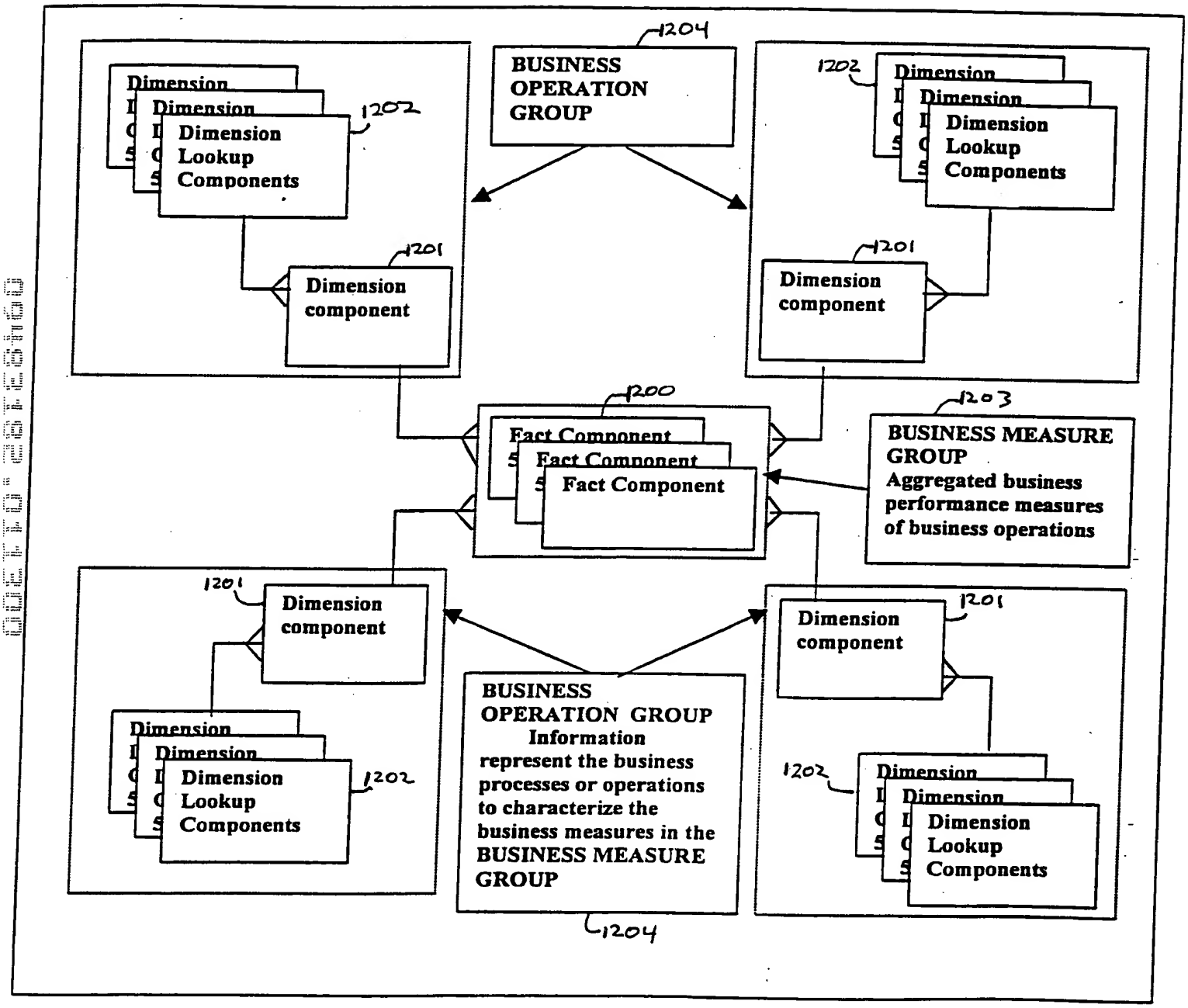

1204
BUSINESS OPERATION GROUP
Dimension
Dimension
Dimension Lookup Components
1202
Dimension component
1201
1200
Fact Component
Fact Component
Fact Component
1203
BUSINESS MEASURE GROUP
Aggregated business performance measures of business operations
BUSINESS OPERATION GROUP
Information represent the business processes or operations to characterize the business measures in the BUSINESS MEASURE GROUP
1204

Fig. 6A

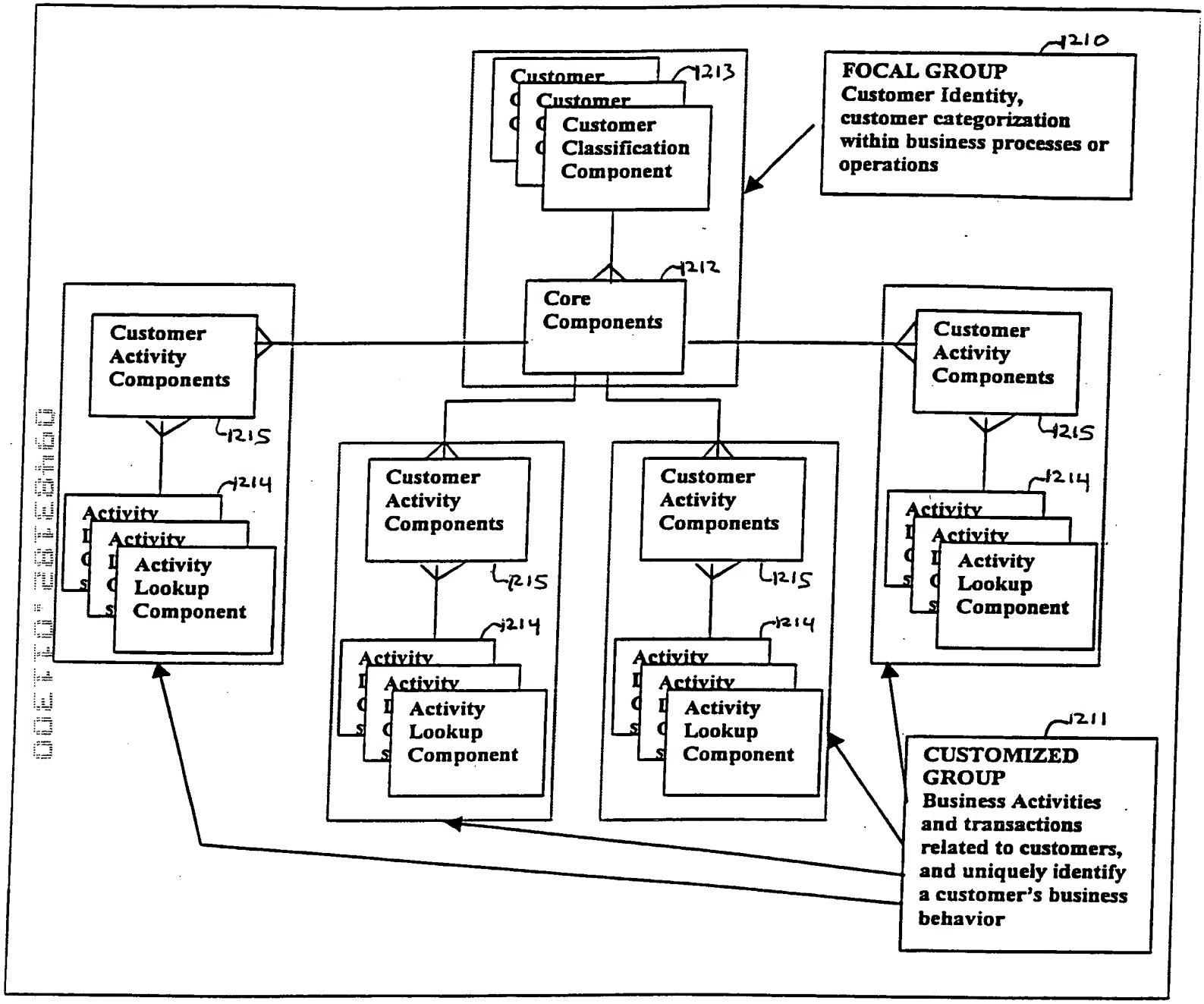

1210
FOCAL GROUP
Customer Identity, customer categorization within business processes or operations
1213
Customer
Customer
Customer Classification Component
1212
Core Components
Customer Activity Components
1215
1214
Activity
Activity
Activity Lookup Component
1211
CUSTOMIZED GROUP
Business Activities and transactions related to customers, and uniquely identify a customer's business behavior

Fig. 6B

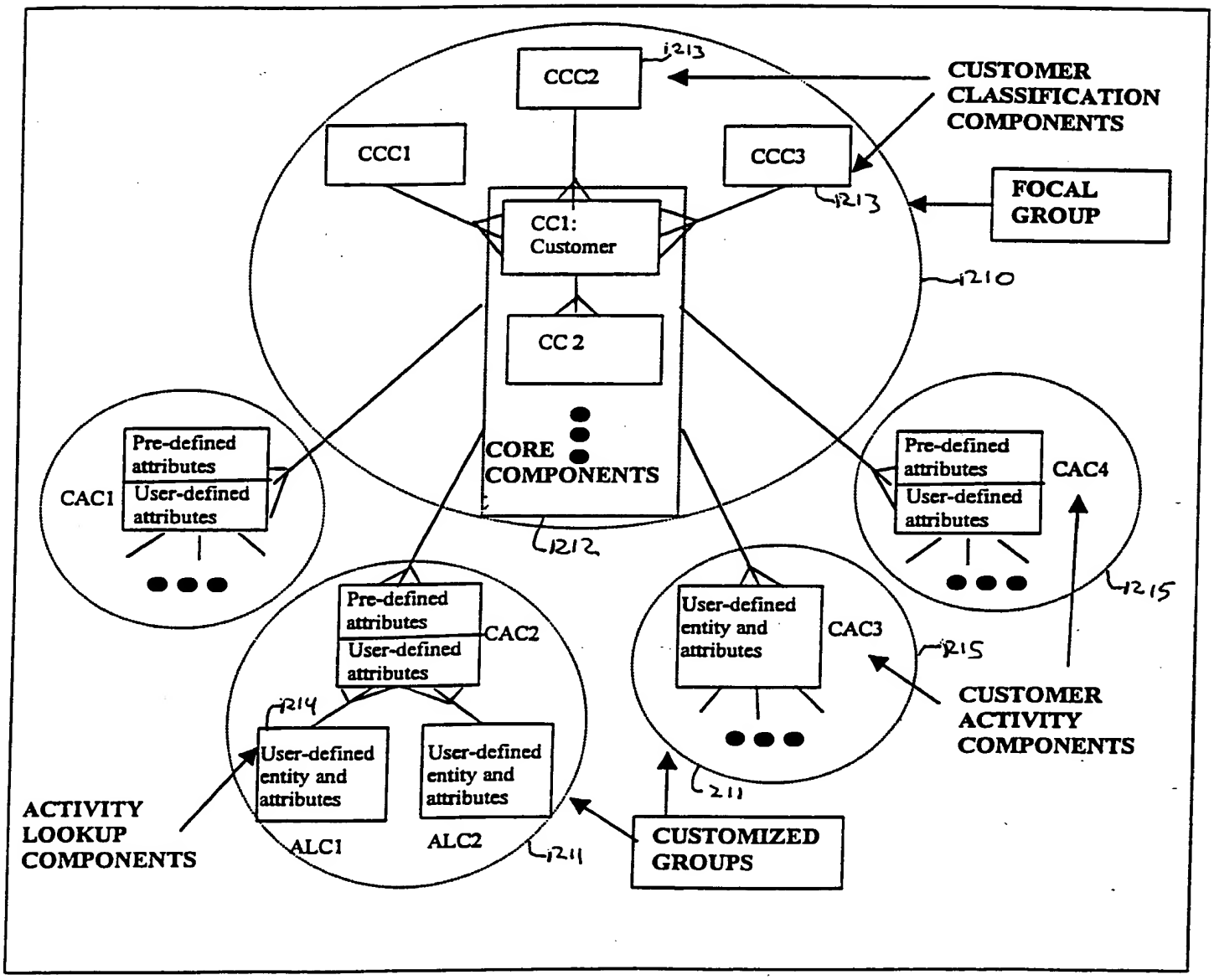

CCC2
1213
CUSTOMER CLASSIFICATION COMPONENTS
CCC1
CCC3
FOCAL GROUP
1213
CC1: Customer
1210
CC 2
CORE COMPONENTS
1212
Pre-defined attributes
User-defined attributes
CAC1
Pre-defined attributes
User-defined attributes
CAC4
1215
Pre-defined attributes
User-defined attributes
CAC2
1214
User-defined entity and attributes
CAC3
215
CUSTOMER ACTIVITY COMPONENTS
User-defined entity and attributes
User-defined entity and attributes
ALC1
ALC2
1211
211
ACTIVITY LOOKUP COMPONENTS
CUSTOMIZED GROUPS

Fig. 6C

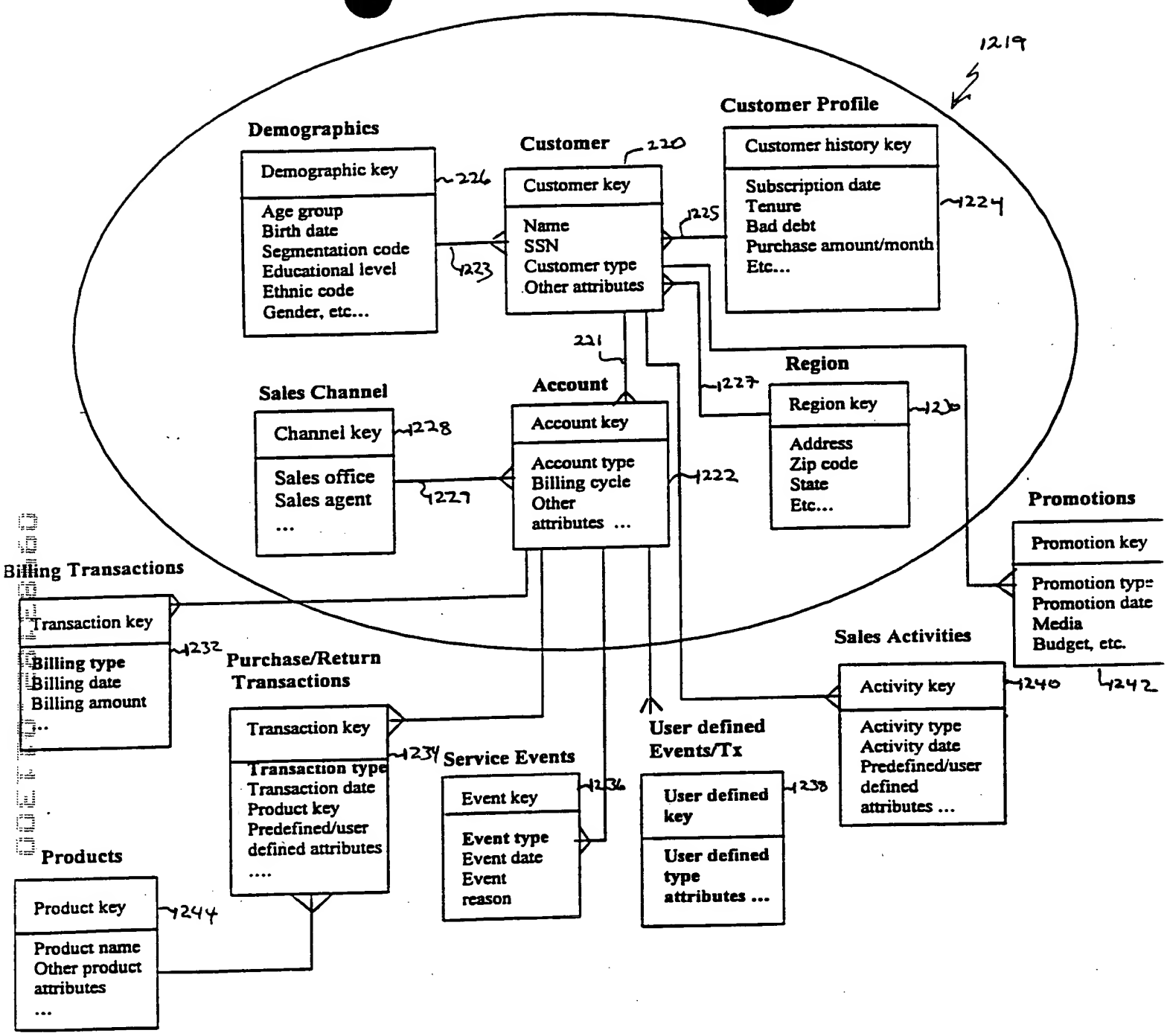

1219
Customer Profile
Demographics
Customer
220
Customer history key
Demographic key
226
Customer key
Subscription date
Tenure
Bad debt
Purchase amount/month
Etc...
1224
Age group
Birth date
Segmentation code
Educational level
Ethnic code
Gender, etc...
1223
Name
SSN
Customer type
Other attributes
1225
221
Region
Sales Channel
Account
1227
Region key
1230
Channel key
1228
Account key
Address
Zip code
State
Etc...
Sales office
Sales agent
...
1229
Account type
Billing cycle
Other
attributes ...
1222
Promotions
Promotion key
Billing Transactions
Promotion type
Promotion date
Media
Budget, etc.
Transaction key
1232
Billing type
Billing date
Billing amount
...
Sales Activities
Purchase/Return
Transactions
Activity key
1240
1242
Transaction key
1234
Transaction type
Transaction date
Product key
Predefined/user
defined attributes
....
Service Events
User defined
Events/Tx
Activity type
Activity date
Predefined/user
defined
attributes ...
Event key
1236
User defined
key
1238
Event type
Event date
Event
reason
User defined
type
attributes ...
Products
Product key
1244
Product name
Other product
attributes
...

Fig. 6D